Canada Health Infoway

Canadian FHIR Exchange (CA:FeX) Release 2

Pan-Canadian Projectathon

March 2023

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The Journey to CA:FeX

Patient Summary: An Interoperability Priority Area

Extensive consultations with jurisdictions, clinicians, patients and industry identified **patient summaries** as an **interoperability priority** area to solve several key challenges.

Patient Summaries can help improve:

- Coordination of care and clinical workflow efficiencies
- Health outcomes and patient safety
- Patient and provider experiences
- Cross-jurisdictional patient flows

Clinical uses of Patient Summaries may include:

- Medical emergencies
- Unfamiliar provider at point of care (e.g., unattached patient)
- Coordination/Transitions of care

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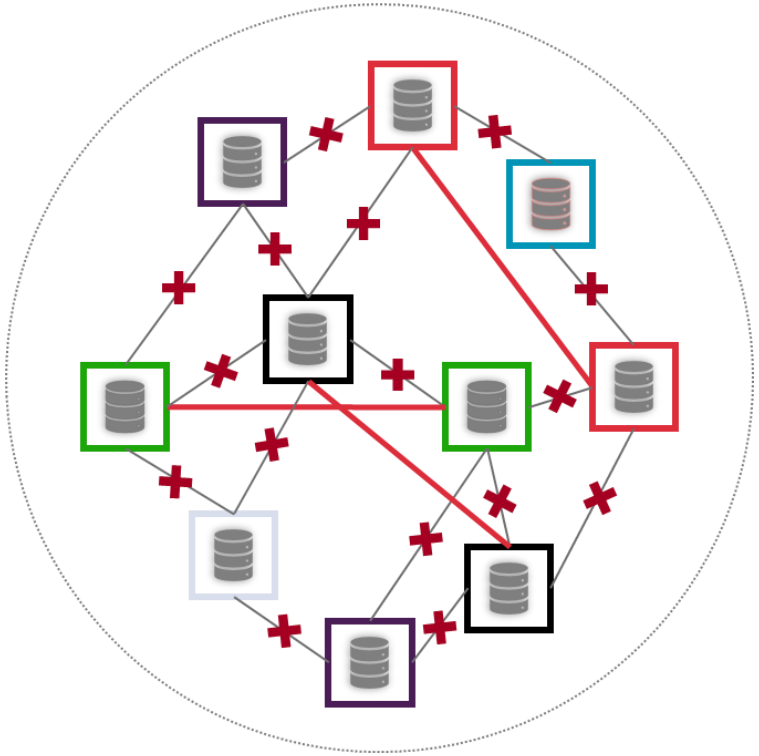
The Need to Exchange and Share the Patient Summary At Scale

PS-CA is primarily a content specification that sets the minimum expectation with respect to data requirements. Without a widely accepted mechanism for making the Patient Summary available, the utility of the content as a standalone is limited.

PS-CA Guidance on Minimum Data Set

	IPS-UV		PS- CA	AB	BC	MB	NL	ON	SK	v1.0.0 TI	Future
Header	Subject	Header	Subject								+
	Author		Author								+
	Attester		Attester								+
	Custodian		Custodian								+
Required	Medication Summary	Recommended	Medication Summary								+
	Allergies and Intolerances		Allergies and Intolerances								+
	Problem List		Problem List								+
Recommended	Immunizations		Immunizations								+
	History of Procedures		History of Procedures								+
	Medical Devices		Medical Devices								
	Diagnostic Results		Diagnostic Results								
Optional	Vital Signs	Optional	Vital Signs								+
	Past history of Illness		Past History of Illness								+
	Social History		Social History								+
	Advance Directives		Advance Directives								
	Pregnancy		Pregnancy								
	Functional Status		Functional Status								
	Plan of Care		Plan of Care								
		EXT	Extension(s)								
			Family History								+

Without some guidance and standardization in the exchange ecosystem, vendors must customize their solution to meet the many requirements of each trading partner



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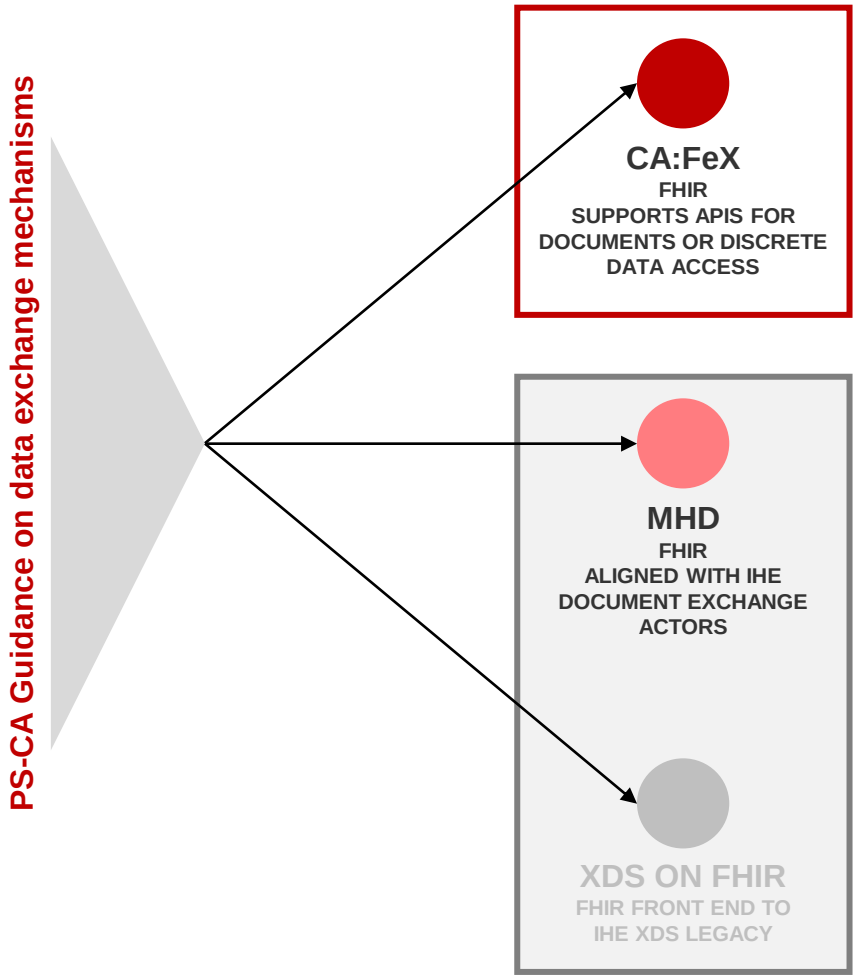
		EXT	Extension(s)								
		EXT	Family History								+



Canadian Specification

- Market interest to assemble a core FHIR document with resources at the source drove the creation of CA:FeX v1.0

Existing International Exchange Patterns

- PS-CA points to MHD as an established exchange pattern (IHE interoperability standard). However, the FHIR-based standard at the time required submission of Binary and use of List, limiting representation of the document to other formats in the future and requiring additional steps in retrieval.
- The market indicated the need for an alternative.

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Scope of CA:FeX v1.0.0 TI

Patient Summaries, a new document type (unburdened by legacy formats) were the right starting point for CA:FeX guidance.

The CA:FeX specification **started** with FHIR-based multi-resource (document) exchange.

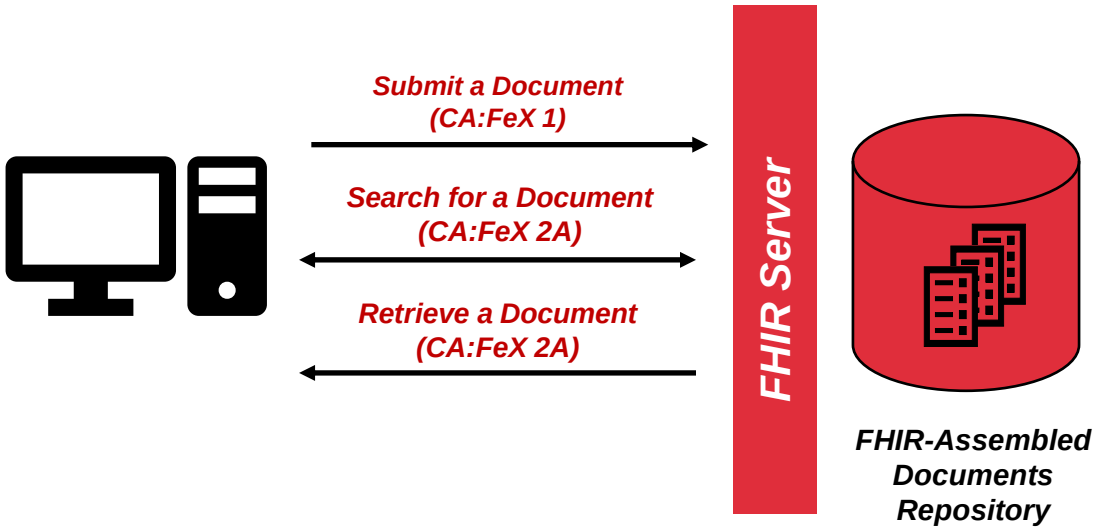
FHIR supports multiple representations of documents, including **FHIR-assembled documents** (e.g., bundle with composition) and FHIR-enabled documents (e.g., binary) and references (e.g., DocumentReference). These are FHIR formats that allow for RESTful exchange.

The inception of CA:FeX v1.0.0 TI only aimed to cover the gap of MHD (e.g., did not support Bundle/Composition). Therefore, the **first release of the specification** focused on providing **guidance** for the **exchange of FHIR-Assembled Documents.**

Exchange of FHIR-Assembled Documents is **just one expression** of how data is expected to be exchanged in Canada.

CA:FeX has the opportunity to introduce guidance on a **more comprehensive** set of capabilities that **FHIR clients and servers** in Canada could be **expected to support**.

CA:FeX v1.0.0 TI Interactions



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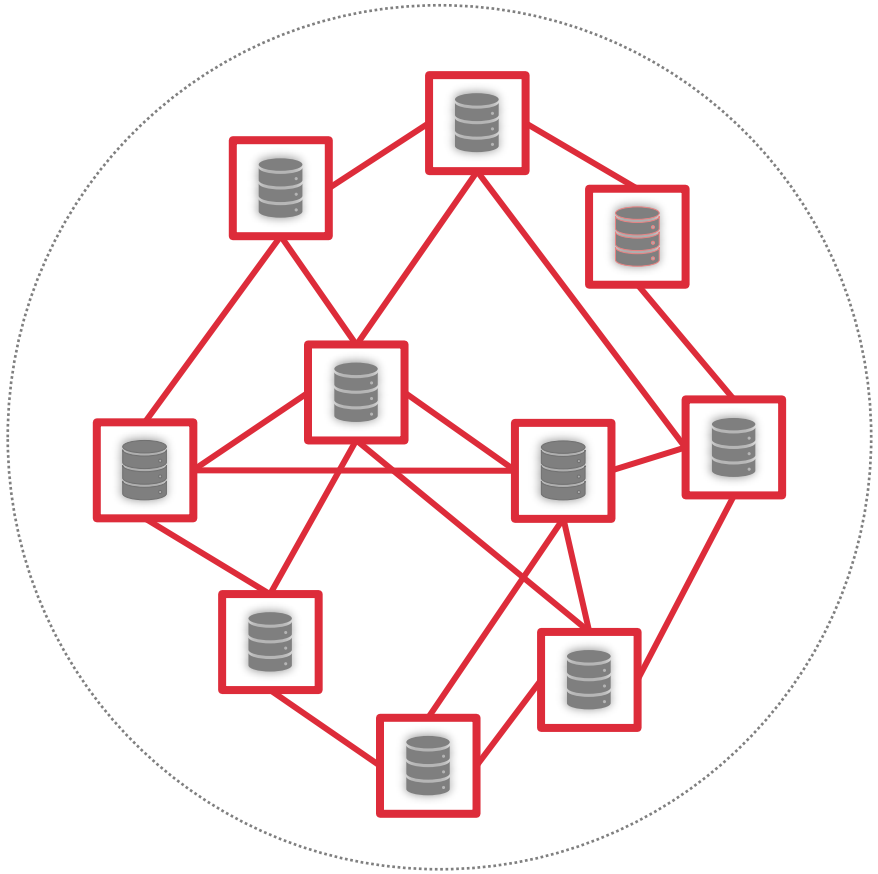
CA:FeX Evolution

A Vision for Canadian FHIR Exchange



*CA:FeX intends to standardize the adoption of **FHIR based health information exchange patterns** across Canada through the development of a **pan-Canadian FHIR API guide**. It intends to do this by providing a **minimum set of capability expectations** for any actors participating in the exchange of health information **(single or multi resource).***

*These core capabilities will become **predictable building blocks** for Canadian implementers to meet their implementation needs. By building on this standard, Canadian implementers and vendors can **be confident that their investments in FHIR** capabilities will **be reusable and support cross-system interoperability by-design**.*

CA:FeX R2 – Placing Canada at the Intersection of International Standards

The Canadian market is well positioned to incorporate the learnings (and influence) of International FHIR Standards

International specifications are attempting to standardize minimum expectations for exchanging FHIR resources

- **Generalized guidance** exists in international standards (e.g., IHE QEDm) for exchanging FHIR resources with the **explicit purpose of sharing clinical information**
- International API standards (e.g., IPA) are also evolving to define a **predictable experiences** for **clinical data integrators & consumers**
- International information standards are defining **minimum content expectations under certain exchange contexts** (e.g., IPS)

CA:FeX addresses these realities by designing around the following principles:

- Prioritize a consistent **predictable experience** for **FHIR Integrators & Data Consumers**
- Reduce rework and unnecessary customization for implementers by **pursuing alignment and contribution to International Standards** (e.g., QEDm, IPA, IPS)
- Scope each release to include minimum capabilities that are **reachable for innovators in the market** at the point in time

CA:FeX R2 – Place within the pan-Canadian Interoperability Roadmap

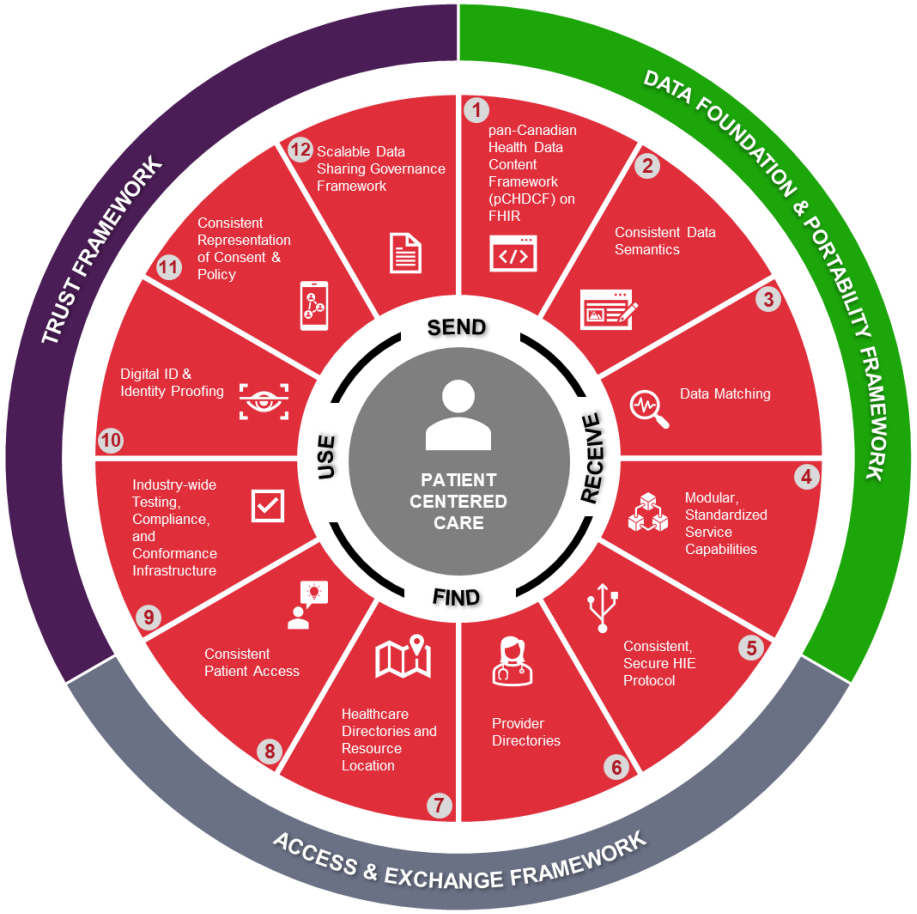
CA:FeX is one piece of the larger set of building blocks that implementers will need to incorporate into their systems to facilitate the exchange of Personal Health Information across providers.

Interoperability Roadmap Building Blocks

4 MODULAR, STANDARDIZED SERVICE CAPABILITIES

+

5 CONSISTENT, SECURE HIE PROTOCOL



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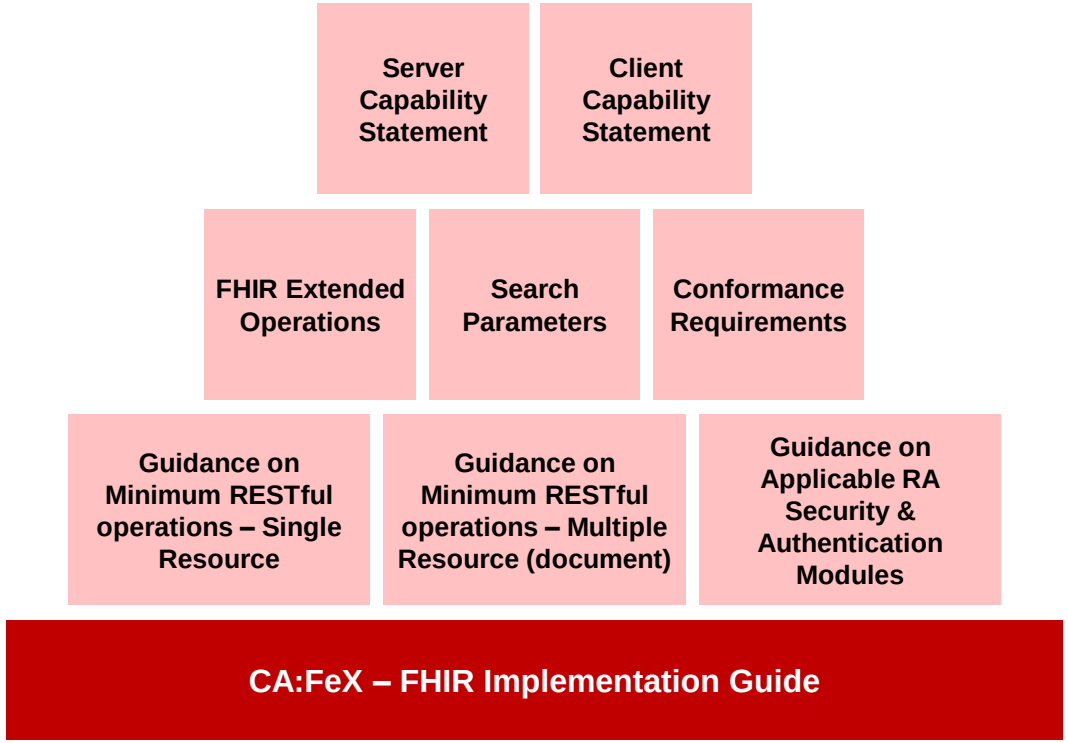
Scope of CA:FeX R2: A Foundation for FHIR Servers and Applications

The **CA:FeX 2.0.0 DFT specification** has expanded its scope to cover the set of exchange paradigms that are expected to be used by early FHIR Implementers:

Single Resource Exchange, e.g., search for a patient's allergies: RESTful exchange behaviors and identification of the interaction support capabilities (read, search, create, update, and delete) and a reference to a subset of FHIR resource types that systems must support to enable single resource exchanges.

Multi-Resource Exchange, e.g., retrieve a Patient Summary document: Approaches for exchanging multiple resources together in the form of documents, and identification of standardized search parameters and practices for document implementers to incorporate into guides and systems.

Extending APIs with FHIR Operations: e.g., $summary: Identification of functional FHIR operations that allow implementers to abstract complexity away from requesting applications, by offering a single API call that can trigger multi-step processes to execute.



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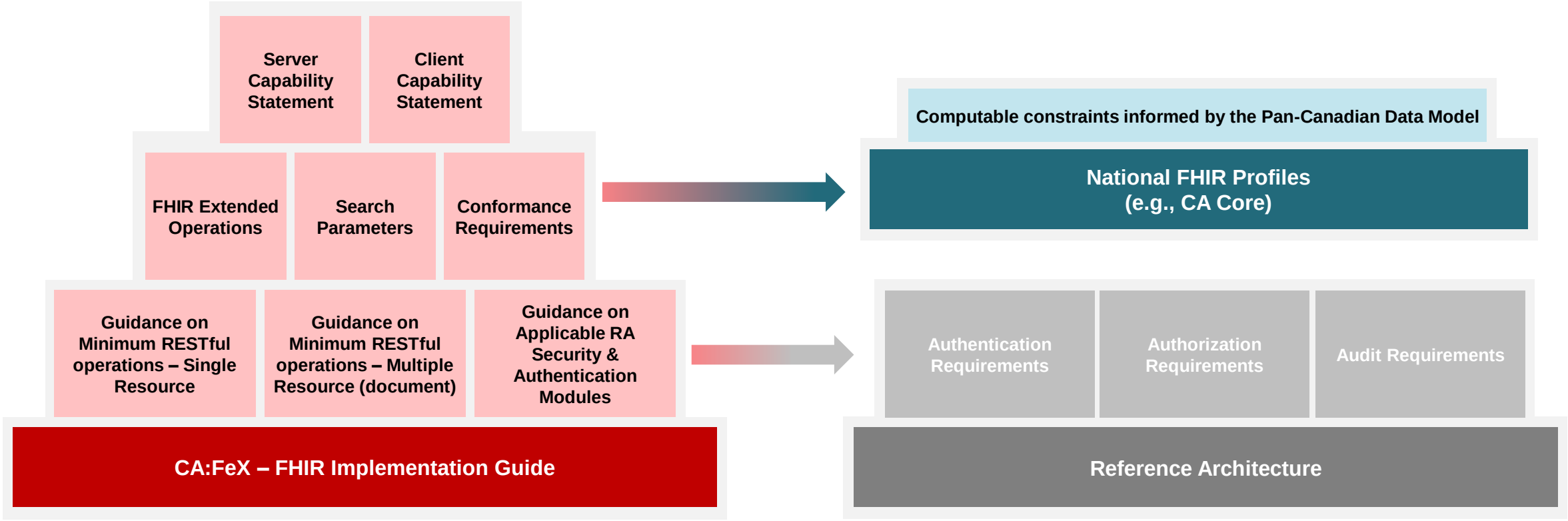
CA:FeX R2 Building Blocks (Illustrative)

Below is a simple illustration, highlighting the scope and potential building blocks of CA:FeX v2.0.0. Based on the implementation patterns selected, CA:FeX v2.0.0 may provide the applicable guidance for specific RA components.



Note: Building blocks within RA are not exhaustive; this illustration only highlights the components that CA:FeX currently points to.

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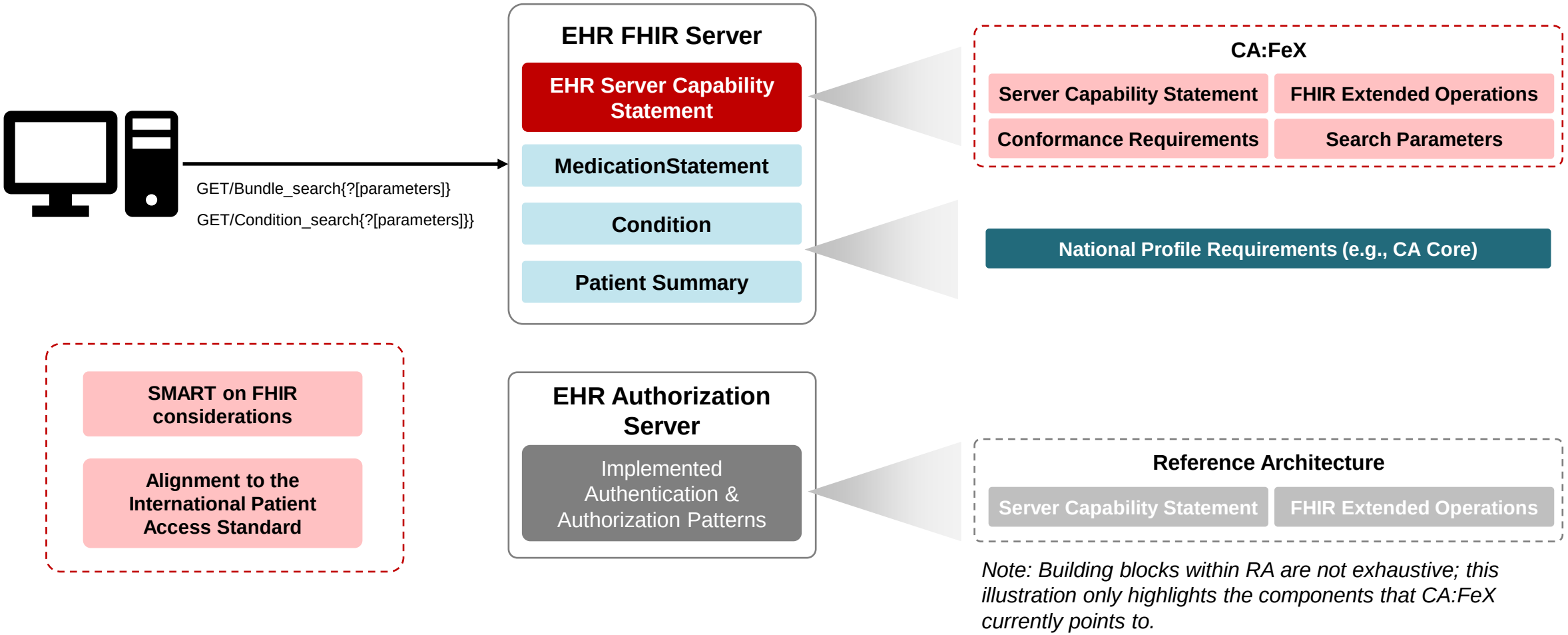
Illustrative Example of CA:FeX R2 in the Real World

Scenario: Retrieve a patient's Condition (single resource) & Patient Summaries (multi resources) from past treatment locations to inform a diagnosis from a specialist.



Note: Building blocks within RA are not exhaustive; this illustration only highlights the components that CA:FeX currently points to.

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How does CA:FeX R2 Position Us for Real World Challenges

The shift towards FHIR-enabled RESTful exchange in Canada will naturally uncover a variety of methods and workflows available for ecosystems to implement against a given use case (e.g., push to central repositories, intermediate retrieval)

As CA:FeX evolves to accommodate and address these realities – **FHIR Extended Operations** provide a promising backdrop for abstracting this complexity away from data consumers & integrators.

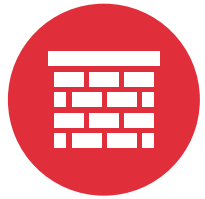
Operations are not a silver bullet for every implementation

Example: Some data sources expect Patient Summaries to be submitted directly by primary care physicians, others allow for data elements to be contributed so that a Patient Summary can be generated automatically at the time of request.

It's challenging and costly for applications to anticipate and build for each environment.

Need to be validated and refined collaboratively to ensure they hold up in the Canadian market

$summary operation: This operation asks for the latest appropriate summary for a patient (whether it already exists or must be newly generated) and returns the latest summary in the form of a FHIR Document.



Requires infrastructure & governance to grow to support the adoption of capabilities that help us align

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Latest News on IPS generation from HL7 International WG

HL7 Technical Steering Committee member for the 2023-2024 term

Implementation Representative:

James Agnew – CTO, Smile DH

Updates from the January 2023 Connectathon, Henderson, Nevada

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Engaging with CA:FeX 2.0.0

CA:FeX 2.0.0 DFT Implementation Guide – Published on Simplifier

- Collaborative interoperability projects (aligned with the roadmap) forthcoming to validate and refine CA:FeX capabilities & adoption

Canadian FHIR Exchange White Paper – Circulated After the Projectathon

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Thank you

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CA:FeX 2.0.0 – Glimpse into the Constraints in the Most Recent Release

Computable Expectations on Servers

CA:FeX Server RESTful Capabilities

The CA:FeX Server SHALL:

- Support the Patient resource.
- Support at least one additional resource from the list of CA:FeX resources (listed in the next section).
- Implement the RESTful behavior according to the FHIR specification.
- Follow the requirements documented in the Conformance Requirements and Must Support page.
- Support JSON source formats for all CA:FeX interactions.

The CA:FeX Server SHOULD:

- Support XML source formats for all CA:FeX interactions.

Security:

- See the General Security section for requirements and recommendations.
- A server SHALL reject any unauthorized requests by returning an HTTP 401 "Unauthorized", HTTP 403 "Forbidden", or HTTP 404 "Not Found" (for details please refer to the Response Handling page)

RESTful Capabilities by Resource

Resource Type	Supported Searches	Mandatory Interactions	Supported Operations
AllergyIntolerance	patient, patient+clinical-status	search-type, read	-
Binary	-	read	-
Bundle	timestamp, composition	search-type, read	-
Composition	patient, type, status, author, date	search-type, read	-
Condition	patient, patient+category, patient+clinical-status, patient+code, patient+onset-date	search-type, read	-
DiagnosticReport	patient, patient+category, patient+code, patient+category+date, patient+status, patient+code+date	search-type, read	-
DocumentReference	_id, patient, patient+category, patient+category+date, patient+type, patient+status, patient+type+period	search-type, read	docref
Immunization	patient, patient+date, patient+status	search-type, read	-
Medication	-	read	-
MedicationRequest	patient, patient+intent, patient+intent+status, patient+intent+authoredon	search-type, read	-
MedicationStatement	patient	search-type, read	-
Observation	patient+category, patient+code, patient+category+date, patient+category+status, patient+code+date	search-type, read	-
Patient	_id, identifier, name, birthdate+name, gender+name, birthdate+family, family+gender	search-type, read	-
Practitioner	name, identifier, _id	search-type, read	-
PractitionerRole	specialty, practitioner	search-type, read	-
Procedure	patient, patient+date	search-type, read	-

Guidance on Conditional Operations & Search Parameters

Operations

The FHIR specification defines a special kind of operations that have an RPC-like functionality. These are called "Execute Operations", or simply "Operations" throughout the FHIR specification. These FHIR operations can be executed against a FHIR server, type, or resource instance. These invocations are named using the convention $name (i.e. the name is prefixed with $) and will generally take a Parameters resource as input and output.

Approach Towards Operations

Because this guide is aimed at ensuring a core set of capabilities and behaviors are implemented by Canadian systems, the operations highlighted in this guide are not enforced at the same degree as other artifacts (except $docRef operation).

This specification has identified the following
community and implementer's feedback.

$docRef Operation

Industry-leading implementations like the US
"shell" on-demand if the server contains any

Implementations that do not want to perform
referenced FHIR resources alongside the ge

The $docRef operation is currently defined in

Input Parameters:

- *patient* is currently a mandatory input
- *start* and *end* are used as optional inp
  is provided, the most recent or current
- *type* is used as an optional input para
- *on-demand* is an optional input param
- *profile* is the last optional input parame

Operation Output:

If a FHIR Document can be found that match

$document Operation

The $document operation in FHIR is a custo
returned to the client as a full document bun
are located on other servers, it is up to the se

The $document operation is currently define

This operation is useful for accessing the act
reference to documents along with the metad

Search Parameters

The following search parameters have been defined for the CA:FeX. For more information on the FHIR RESTful Search API and the standard see the FHIR specification.

Search Parameters defined by CA:FeX

There are no custom search-parameters defined by CA:FeX implementation guide.

Search Parameters derived from the Base FHIR Specification

Like US-Core, this Implementation Guide constrains 'standard' HL7 search parameters to explicitly declare conformance expectations. These CA:FeX SearchParameters are derived from the Base FHIR Specification to define the expectations for the following SearchParameter elements:

- AllergyIntolerance - patient, clinical-status
- Bundle - timestamp, composition
- Composition - patient, type, status, author, date
- Condition - patient, category, clinical-status, code, onset-date
- DiagnosticReport - patient, category, code, date, status
- DocumentReference - _id, patient, category, date, type, status, period
- Immunization - patient, date, status
- MedicationRequest - patient, intent, status, authoredon
- MedicationStatement - patient
- Observation - patient, category, code, date, status
- Patient - _id, identifier, name, birthdate, gender, family
- Practitioner - name, identifier, _id
- PractitionerRole - specialty, practitioner
- Procedure - patient, date

AllergyIntolerance

Conformance	Parameter	Type
SHALL	patient	reference
SHOULD	patient+clinical-status	reference+token

Bundle

Conformance	Parameter	Type
SHOULD	timestamp	date
SHOULD	composition	reference

Composition

Conformance	Parameter	Type
SHALL	patient	reference
SHOULD	type	token
SHOULD	status	token

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